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Memorandum

Date: March 15, 2011

To: LaDonna Turner, Site Assessment Manager
Technical and Enforcement Branch
U.S. Environmental Protection Agency, Region 6

From: Dana Bahar, Manager
New Mexico Environment Department, Ground Water Quality Bureau, Superfund
Oversight Section

Subject: Pre-CERCLIS Screening Assessment of the Zia Mine Site, Ambrosia Lake Mining
District, Cibola County, New Mexico: Further Investigation under CERCLA
Recommended

Site name	Zia Mine (NM0076)	Street address	Not Applicable	Zip code	Not Applicable
City	Not Applicable	State	New Mexico		
County	Cibola County				
Latitude	35°15'49.69" N	Longitude	107°46'26.10" W		

Site physical description:

The Zia Mine (Site) is located approximately four miles northeast of the intersection of State Highways 334 and 605, near the former Homestake Mill site, north of Grants, New Mexico (Figure 1). The Site is situated on U.S. Forest Service property, and access to the Site is via Forest Service Road 450 in the San Mateo Creek Basin. The Site is characterized as a "dry" mine consisting of surface mining and underground workings, including two surface excavation areas, a prospecting trench, an adit, and numerous waste rock piles encompassing a total disturbed area of approximately 10 acres. The Site is situated on a small mesa at an elevation is approximately 7,000 feet above mean sea level on the southwest slope of La Jara Mesa, and two east-west trending arroyos/ephemeral streams are located approximately 0.25 miles northeast and southeast bordering the Site.

Site identification:

The Site identification number is NM0076, according to the New Mexico Energy, Minerals and Natural Resources Department, Mining and Minerals Division (MMD) database. The Site is one of 97 legacy uranium mines identified within the Ambrosia Lake mining district of the Grants Mineral Belt.

Site summary:

Based on Orin J. Anderson's observations (1980), the main excavation area is an east-west trending box cut that measures approximately 120-feet wide by 200-feet long, and 30-feet deep. The prospecting trench is also east-west trending and measures approximately 15-feet wide by 120-feet long, and reaches 11-feet deep at the center. Two crudely timbered adits extend south and west from the main excavation reaching approximately 6 to 18 feet underground (due to collapse) into the Todilto limestone host rock.

According to Anderson (1980), scintillometer readings as high as 1,700 counts per second (cps) were measured inside the south-facing mine adit, and approximately 600 cps (about 8 times background) inside the west-facing mine adit. Scintillometer readings of waste rock at the west end of the prospecting trench were approximately 150 cps, and reached a maximum of 600 cps in material stockpiled at the east end of the trench.

Based on field reconnaissance performed in April 2008 by MMD's contractor, Souder Miller and Associates (SMA), specific mining features that were observed include two excavations: the first excavation area (i.e. backfilled box cut) is approximately 100-feet wide by 285-feet long, and 6-feet deep with a trench extending west; the second excavation area (in the center of the Site) is approximately 120-feet wide by 300-feet long, and 25-feet deep; and one lateral adit extends approximately 15-feet deep from the larger excavation. In addition, numerous waste rock piles (approximately 100 piles) were observed with an estimated total volume of approximately 1,500 cubic yards.

As part of the field observations, SMA conducted a radiological survey and recorded gamma radiation measurements at a background location and 42 survey locations across the Site. Measurements were taken at the ground surface and four feet above the ground surface at each survey location using a Ludlum Model 19 Micro-R meter to record gamma radiation in micro Roentgen per hour ($\mu\text{R/hr}$).

The background gamma radiation level was approximately 10 $\mu\text{R/hr}$. Across the Site, gamma radiation measurements ranged from a minimum of 12 $\mu\text{R/hr}$ to a maximum of 140 $\mu\text{R/hr}$ at the surface, and from 10 to 140 $\mu\text{R/hr}$ for measurements taken at the 4-foot level. Eighteen surface measurements and 14 measurements taken at the 4-foot level exceeded the background radiation level by a factor of three times (i.e. greater than 30 $\mu\text{R/hr}$).

Targets:

Based on a query of the New Mexico Office of the State Engineer (OSE), Water Rights Reporting System database, from a total of 78 well records (Table 1), there are 42 private/domestic wells within a 4-mile radius of the site (Figure 1). There are two domestic wells located approximately 1.5 miles from the Site; however, there are no residences associated with these wells. The area surrounding the Site is predominately range land, and there are no municipal water supply wells within a 4-mile radius of the Site. The depth to ground water is approximately 70 feet below ground surface in a livestock well located approximately two miles southwest of the Site (Table 1). NMED Superfund Oversight Section (SOS) staff sampled this livestock well in March 2009. The ground water sampling results indicate that total dissolved solids (TDS), sulfate, and nitrate/nitrite exceed the New Mexico Water Quality Control Commission (NMWQCC) standards for these contaminants. In addition, dissolved uranium was detected at a concentration of 0.041 milligrams per liter (mg/L), which exceeds the NMWQCC standard (0.03 mg/L). NMED-SOS also sampled five wells near State Highway 605 located approximately 3 to 4 miles from the Site. TDS concentrations in these five wells exceeded the NMWQCC standards. In addition, dissolved uranium was detected at concentrations ranging from 0.006 to 0.228 mg/L, and samples from three wells that are screened in the alluvial aquifer exceeded the NMWQCC standard.

The surface water pathway has been evaluated and contaminants could potentially migrate offsite via surface water runoff to two east-west trending arroyos/ephemeral streams that are located approximately 0.25 miles northeast and southeast bordering the Site. In addition, the accumulation of standing water in contact with waste rock piles may introduce contaminants to pooled water that could be consumed by cattle and animals.

Radiological surveys were conducted (as described in the site summary above) and used for the evaluation of the soil exposure pathway. Soil exposure from elevated radioactivity (three times greater than background) may pose a threat to human health and the environment. No data acquisition was performed for the evaluation of an air pathway.

Site ownership and Potential Responsible Parties:

The Site is under U.S. Forest Service land ownership. Mining was conducted by J.M. Keeney in 1952; the La Jara Mining Company in 1954; Florida Minerals in 1956; the Zia Mining Company from 1957 to 1958; and the Chena Mining Company in 1960.

File review:

The references listed below were reviewed for the development of this pre-CERCLIS screen.

Site reconnaissance:

Orin J. Anderson of the New Mexico Bureau of Mines and Mineral Resources visited the Site in 1980. NMED-SOS personnel conducted field reconnaissance in October 2007. The Zia Mine is accessible via Forest Service Road 450 in the San Mateo Creek Basin (see Photographs 1 to 4). Souder Miller and Associates (SMA), a contractor to the New Mexico Energy, Minerals and Natural Resources Department, Mining and Minerals Division, visited the Site and conducted a radiological survey on April 15, 2008.

Recommendation:

Further investigation of the Site under CERCLA is recommended to assess any physical hazards as well as the areal extent of elevated radioactivity readings (three times greater than background) to determine if threats to human health and the environment exist.

Numerous waste rock piles (approximately 100 piles) were observed with an estimated total volume of approximately 1,500 cubic yards. Radioactivity readings ranged from 12 to 140 $\mu\text{R/hr}$ at the surface, and from 10 to 140 $\mu\text{R/hr}$ for measurements taken at the 4-foot level. Eighteen surface measurements and 14 measurements taken at the 4-foot level exceeded the background radiation level by a factor of three times (i.e. greater than 30 $\mu\text{R/hr}$).

Currently, the existence of regional impacts from legacy uranium sites to the ground water system has not been determined. Ground water impacts from "dry" mines such as this Site could potentially impact the alluvial ground water system through leaching of contaminants from waste rock piles. Furthermore, contaminants could potentially migrate offsite via surface water runoff to the two arroyos/ephemeral streams that border the Site. The accumulation of standing water in contact with waste rock materials may introduce contaminants to pooled water that could be consumed by cattle and animals.

A comprehensive investigation of potential impacts to ground water from "dry" former uranium mines within the Grants Mining District is recommended as part of regional ground water quality characterization. Depending upon the results of this investigation, site-specific ground water characterization activities may be warranted.

References:

Anderson, Orin J., 1980, Abandoned or Inactive Mines in New Mexico. New Mexico Bureau of Mines and Mineral Resources, Open-file Report 148.

New Mexico Energy, Minerals and Natural Resources Department, Mining and Minerals Division, July 2008, Abandoned Uranium Mine Field Survey Project, Zia Mine Report, prepared by Souder Miller and Associates (SMA).

New Mexico Energy, Minerals and Natural Resources Department, Mining and Minerals Division, 2007, Abandoned and Inactive Uranium Mines Database.

New Mexico Environment Department, Superfund Oversight Section, 2010, Geochemical Analysis and Interpretation of Ground Water Data Collected as part of the Anaconda Company Bluewater Uranium Mill Site Investigation (CERCLIS ID NMD007106891) and San Mateo Creek Site Legacy Uranium Sites Investigation (CERCLIS ID NMN00060684), McKinley and Cibola County, New Mexico. Draft Released May 2010.

New Mexico Office of the State Engineer (OSE), 2010, New Mexico Water Rights Reporting System Database, Point of Diversion by Location, 4-mile Radius of Zia Mine Site.

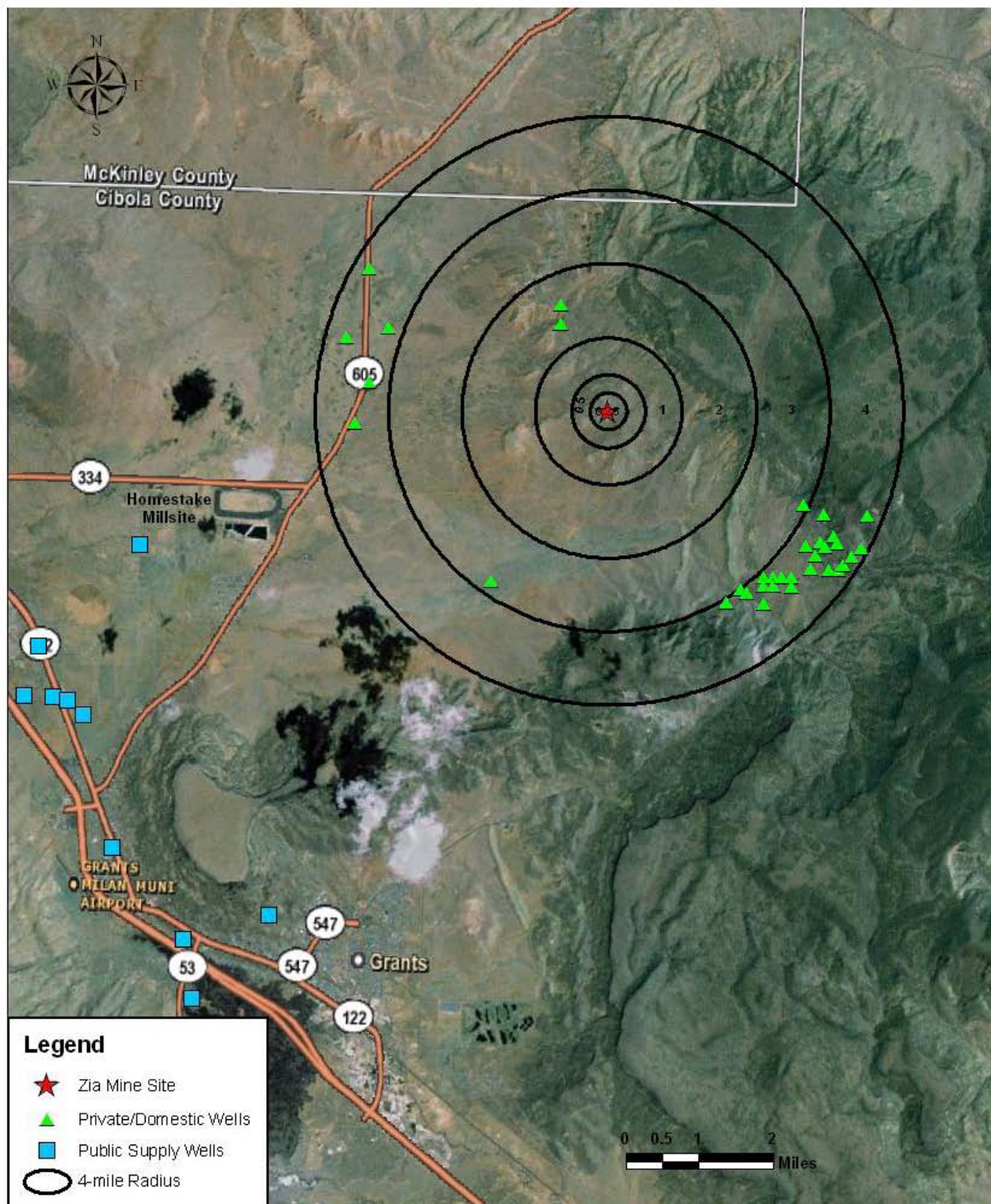


Figure 1: Wells within a 4-mile Radius of the Site (OSE 2010)

Table 1: All Records for Private Wells within a 4-mile Radius of the Site

Well Use (OSE Designation) ¹	Domestic & Livestock (DOL), Domestic-One Household (DOM), and Domestic-Multiple Households (MUL) ²		Irrigation (IRR), Livestock (STK), and Sanitary/Commercial (SAN)		Exploration (EXP), and Monitoring (MON)		Other/Unassigned		Totals
Distance from Site (miles)	Number of wells	Water Level : Well Depth (Feet-BGS)	Number of wells	Water Level : Well Depth (Feet-BGS)	Number of wells	Water Level : Well Depth (Feet-BGS)	Number of wells	Water Level : Well Depth (Feet-BGS)	Number of wells
0 to 0.25	0	NA	0	NA	0	NA	0	NA	0
0.25 to 0.5	0	NA	0	NA	0	NA	0	NA	0
0.5 to 1	0	NA	0	NA	0	NA	0	NA	0
1 - 2	2	ND : 300	4	70 : 160-450	0	NA	0	NA	6
2 - 3	2	42 : 142	2	ND : ND	0	NA	0	NA	4
3 - 4	38	50-360 : 120-600	6	140 : 240-750	24	ND : 49-551	0	NA	68
Totals by Category	42		12		24		0		78

Footnotes:

¹ New Mexico Office of the State Engineer (OSE), 2010, New Mexico Water Rights Reporting System Database, Point of Diversion by Location

² Private/Domestic Wells shown on Figure 1.

ND No Data/Not Determined

NA Not Applicable



Photo 1: Southeast view from the Zia Mine Site which is reached via U.S. Forest Road 450 along the southwest side of La Jara Mesa in the San Mateo Creek Basin.



Photo 2: Numerous waste rock piles around the Zia Mine Site.



Photo 3: Soil Erosion from surface water runoff through waste rock piles at the Zia Mine Site.



Photo 4: More waste rock piles around the Zia Mine Site.